

1. A process to inhibit or limit the decomposition of a halide-containing olefin oligomerization catalyst system during recovery of an oligomerization product comprising the steps of:

- 5 a) forming an intermediate stream by contacting an olefin oligomerization reactor effluent stream which comprises olefin product(s), catalyst system, and heavies with an alcohol that is soluble in any portion of the reactor effluent stream;

wherein the catalyst system comprises a chromium source, a pyrrole-containing compound and an alkylaluminum compound and wherein the alcohol is added in an amount to effect a mole alcohol to mole aluminum ratio between about 2.5 and about 1.5.

- 10 2. The process of claim 1 further comprising the step of:

b) separating the intermediate stream of step (a) into at least one product stream comprising olefin oligomerization product and at least one heavies stream.

3. The process of claim 1 wherein the reactor effluent stream comprises olefin product(s); an olefin oligomerization catalyst system; an organic diluent; one or more mono-  
15 olefins; and polymer.

4. The process of claim 1 wherein the alcohol has a boiling point different from the olefin product in the reactor effluent stream.

5. The process of claim 1 wherein the alcohol has 6 or more carbon atoms per molecule.

- 20 6. The process of claim 1 wherein the olefin oligomerization catalyst system comprises a halogenated alkylaluminum compound.

7. The process of claim 2 wherein the separation comprises distillation of the product olefin from the product stream.

8. The process of claim 7 wherein the distillation comprises a reboiler and  
25 wherein

material passed through the reboiler is maintained below about 200°C.

9. The process of claim 7 wherein the distillation comprises a reboiler and wherein material passed through the reboiler is maintained below about 190°C.

10. The process of claim 7 wherein the distillation comprises a reboiler and  
5 wherein material passed through the reboiler is maintained below about 175°C.

11. The process of claim 1 wherein the alcohol is selected from the group of 1-hexanol, 3-hexanol, 2-ethyl-1-hexanol, 3-octanol, 1-heptanol, 2-heptanol, 3-heptanol, 4-heptanol, 2-methyl-3-heptanol, 1-octanol, 2-octanol, 4-octanol, 7-methyl-2-decanol, 1-decanol, 2-decanol, 3-decanol, 4-decanol, 5-decanol, 2-ethyl-1-decanol, and mixtures thereof.

10 12. The process of claim 1 wherein the alcohol is selected from the group of diols and polyols.

13. The process of claim 7 wherein the distillation process includes at least two distillation stages.

14. The process of claim 1 wherein the alcohol has been treated to minimize water  
15 content.

15. The process of claim 1 further comprising the step of minimizing water content of the alcohol before step (a).

16. The process of claim 15 wherein the step of minimizing the water content of the alcohol comprises contacting the alcohol with an adsorbent capable of adsorbing water.

20 17. The process of claim 2 wherein the olefin oligomerization product comprises one or more olefin trimers.

18. A process to inhibit or limit the decomposition of a halide-containing olefin oligomerization catalyst system during recovery of the oligomerization product comprising the steps of:

25 (a) minimizing water content in an alcohol; and

(b) forming an intermediate stream by contacting an olefin oligomerization reactor effluent stream which comprises olefin product(s), catalyst system, and heavies with the alcohol;

wherein said catalyst system comprises a chromium source, a pyrrole-containing compound and an alkylaluminum compound and wherein the alcohol is soluble in any portion of the reactor effluent stream.

19. The process of claim 18 further comprising the step of:

(c) separating the intermediate stream of step (b) into at least one olefin oligomerization product stream and at least one heavies stream.

20. A process according to claim 18 wherein said reactor effluent stream comprises olefin product(s); an olefin oligomerization catalyst system; an organic diluent; one or more mono-olefins; and heavies.

21. A process according to claim 18 wherein the olefin oligomerization catalyst system comprises a halide compound and an alkylaluminum compound..

22. A process according to claim 1 wherein the olefin oligomerization catalyst system comprises a halide compound and a metal alkyl compound.

23. A process according to claim 1 wherein the olefin oligomerization catalyst system comprises a mixture of an alkylaluminum compound and a halogenated alkylaluminum compound.

24. A process according to claim 18 wherein the olefin oligomerization catalyst system comprises a halogenated alkylaluminum compound.

25. A process according to claim 18 wherein the olefin oligomerization catalyst system comprises a mixture of an alkylaluminum compound and a halogenated alkylaluminum compound.

26. The process of claim 22 wherein the halogenated alkylaluminum compound is diethylaluminum chloride.

27. The process of claim 24 wherein the halogenated alkylaluminum compound is diethylaluminum chloride.

5 28. The process of claim 18 wherein the alcohol has a boiling point different from the olefin product in the reactor effluent stream.

29. The process of claim 28 wherein the alcohol has 6 or more carbon atoms per molecule.

10 30. The process of claim 18 wherein the alcohol is selected from the group of 1-hexanol, 3-hexanol, 2-ethyl-1-hexanol, 3-octanol, 1-heptanol, 2-heptanol, 3-heptanol, 4-heptanol, 2-methyl-3-heptanol, 1-octanol, 2-octanol, 4-octanol, 7-methyl-2-decanol, 1-decanol, 2-decanol, 3-decanol, 4-decanol, 5-decanol, 2-ethyl-1-decanol, and mixtures thereof.

31. The process of claim 18 wherein the alcohol is selected from the group of diols and polyols.

15 32. The process of claim 19 wherein the separation comprises distillation of the product olefin from the product stream.

33. The process of claim 32 wherein the distillation comprises a reboiler and wherein material passed through the reboiler is maintained below 200°C.

20 34. The process of claim 32 wherein the distillation comprises a reboiler and wherein material passed through the reboiler is maintained below 190°C.

35 The process of claim 32 wherein the distillation comprises a reboiler and wherein material passed through the reboiler is maintained below 175°C.

36. The process of claim 32 wherein the distillation process includes at least two distillation stages.

37. A process to inhibit or limit the decomposition of a halide-containing olefin oligomerization catalyst system during recovery of the oligomerization product comprising the steps of:

(a) forming an intermediate stream by contacting an olefin oligomerization reactor effluent stream which comprises olefin product(s) and catalyst system with an alcohol that is soluble in any portion of the reactor effluent stream; and

(b) separating the intermediate stream of step (a) into at least one olefin oligomerization product stream;

wherein the temperature of step (b) is less than or equal to 200°C.

38. The process of claim 37 wherein the temperature of step (b) is less than or equal to 190°C.

39. The process of claim 37 wherein the temperature of step (b) is less than or equal to 175°C.

40. The process of claim 37 wherein step (b) comprises distillation of olefin product from the product stream.

41. The process of claim 40 wherein the distillation includes at least two distillation stages.

42. The process of claim 37 wherein the reactor effluent stream comprises olefin product(s); an olefin oligomerization catalyst system; an organic diluent; and one or more mono-olefins.

43. The process of claim 37 wherein the alcohol has a boiling point different from the olefin product in the reactor effluent stream.

44. The process of claim 37 wherein the alcohol has 6 or more carbon atoms per molecule.

45. The process of claim 37 wherein the alcohol is selected from the group of 1-hexanol, 3-hexanol, 2-ethyl-1-hexanol, 3-octanol, 1-heptanol, 2-heptanol, 3-heptanol, 4-heptanol, 2-methyl-3-heptanol, 1-octanol, 2-octanol, 4-octanol, 7-methyl-2-decanol, 1-decanol, 2-decanol, 3-decanol, 4-decanol, 5-decanol, 2-ethyl-1-decanol, and mixtures thereof.

5 46. The process of claim 37 wherein the alcohol is selected from the group of diols and polyols.

47. The process of claim 37 wherein the alcohol has been treated to minimize water content.

10 48. The process of claim 37 further comprising the step of minimizing water content in the alcohol before step (a).

49. The process of claim 48 wherein the step of minimizing the water content of the alcohol comprises contacting the alcohol with an adsorbent capable of adsorbing water.

15 50. The process of claim 1 wherein the alkylaluminum compound is a mixture of triethylaluminum and diethyl aluminum chloride, the alcohol is 2-ethyl-1-hexanol, and the olefin product comprises 1-hexene.

51. The process of claim 18 wherein the alkylaluminum compound is a mixture of triethylaluminum and diethyl aluminum chloride, the alcohol is 2-ethyl-1-hexanol, and the olefin product comprises 1-hexene.

20 52. The process of claim 37 wherein the alkylaluminum compound is a mixture of triethylaluminum and diethyl aluminum chloride, the alcohol is 2-ethyl-1-hexanol, and the olefin product comprises 1-hexene.

53. The process of 19 wherein the olefin oligomerization product stream comprises one or more olefin trimers.

25 54. The process of 37 wherein the olefin oligomerization product stream comprises one or more olefin trimers.

55. The process of claim 37 wherein the olefin oligomerization catalyst system comprises a halogenated alkylaluminum compound.

56. The process of claim 53 wherein the halogenated alkylaluminum compound comprises diethylaluminum chloride.

5 57. A process to inhibit or limit the decomposition of a halide-containing olefin oligomerization catalyst system during recovery of the oligomerization product comprising the steps of:

(a) forming an intermediate stream by contacting an olefin oligomerization reactor effluent stream which comprises olefin product(s), catalyst system, and heavies with an  
10 alcohol that is soluble in any portion of the reactor effluent stream; and

(b) separating the intermediate stream of step (a) into at least one olefin oligomerization product stream and at least one heavies stream;

wherein the catalyst system comprises active metal alkyl units, and

15 wherein the alcohol is present in an amount greater than 0.1 and less than about 1.8 equivalents per equivalent of active metal alkyl units.

58. A 1-hexene stream produced by the process of claim 1.